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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/739,975	12/20/2000	Rieko Fukushima	02887.0199	3736

22852 7590 11/04/2002

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EXAMINER
RUDE, TIMOTHY L

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 11/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/739,975	FUKUSHIMA ET AL.	
	Examiner	Art Unit	
	Timothy L Rude	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 14-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 14-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 19 August 2002 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claims

2. Claims 12 and 13 are canceled without prejudice. Claims 8, 14, and 15 are amended, necessitating new grounds of rejection. No new matter is added.

Claim Rejections - 35 USC § 112

3. Claims 14 and 15 are amended per above, and the rejection of claims 14-18 under 35 U.S.C. 112, first paragraph, is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being anticipated by Saishu et al (Saishu) USPAT 5,936,689 in view of Nakamura, USPAT 5,686,019.

As to claim 8, Saishu discloses in Figure 1 (col. 6, line 60 through col. 8, line 45), a liquid crystal display element comprising: a first substrate, 114; a switching element disposed on said first substrate; a second substrate, 102, counter to said first substrate; a first alignment layer formed over said switching element, 118; a second alignment layer, 107, formed over said second substrate, wherein said first and second alignment layers are rubbed in rubbing directions (col. 7, lines 35-40); a light modulating layer, 115, disposed between said first and second substrates wherein the light modulating layer comprises an anti-ferroelectric liquid crystal material having a thresholdless voltage-transmittance characteristic (col. 7, lines 43-45); and a filter, 104, formed on said second substrate, wherein said filter allows specific wavelengths of light to pass.

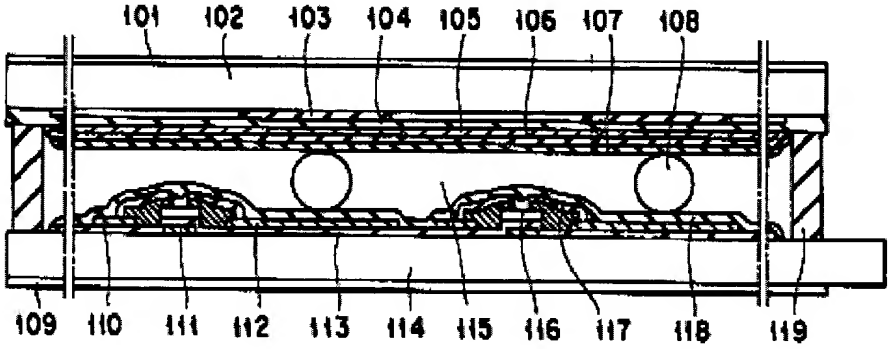

FIG. 1

Saishu does not explicitly disclose an element wherein the surface tension of each of said first and second alignment layers is between about 49 dyn/cm and about 53 dyn/cm.

Nakamura teaches in Example 1 (col. 16, lines 65-69) the use of a surface tension of 50 dyn/cm to establish uniform alignment and improve contrast (col. 17, lines 25-31). Nakamura also teaches in Example 9 (col. 20, lines 64-67) the use of a surface tension of 49 dyn/cm to establish uniform alignment and improve contrast.

Nakamura is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add alignment layers having surface tension in the rage of 49 dyn/cm to 50 dyn/cm (overlaps Applicant's range of 49 dyn/cm to 53 dyn/cm) to establish uniform alignment and improve contrast.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Saishu in with the alignment layer surface tension range of Nakamura to establish uniform alignment and improve contrast.

As to claim 9, Saishu discloses the liquid crystal display element of claim 8 wherein the anti-ferroelectric liquid crystal material (col. 7, lines 43-56) is subject to an alignment process (Applicant's phase comprising Iso, SA and SC).

5. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being anticipated by Tanaka, JP 04-371925, provided by Applicant.

As to claim 1, Tanaka teaches in Drawings 1-3, a liquid crystal display element comprising: a first electrode substrate having a first transparent substrate, 1, a first

electrode, 4, formed on said first substrate, and a first alignment layer, 9, formed on said first substrate so as to cover said first electrode; a second electrode substrate having a second transparent substrate, 2, a second electrode, 5, formed on said second substrate, and a second alignment layer, 10, formed on said second substrate so as to cover said second electrode; and a light modulating layer, 6, of an anti-ferroelectric liquid crystal material (Constitution) which is sandwiched between said first and second electrode substrates covered with first and second alignment layers and which has a thresholdless voltage-transmittance characteristic, wherein said first and second alignment layers are combined with said liquid crystal material so that the angle between the rubbing directions is 6.8 degrees (col. 3, para 0013) (narrow range includes Applicant's shifted angle between the extending direction and an optical axis of a batonnet is within ±1 degree). Applicant's Figure 3 shows the shifted angle between the extending direction and an optical axis of a batonnet, (θ_{OA}-θ_B), is within ±1 degree for all examples where the angle of the optical axis, θ_{OA}, is less than 7 degrees (half the 14 degree angle between the rubbing directions). Tanaka's angle between the rubbing directions is only 6.8 degrees which is much less than 14 degrees, so the resulting shifted angle between the extending direction and an optical axis of a batonnet will be within ±1 degree, per Applicant's Figure 3.

Tanaka is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to establish a difference between the rubbing directions of 6.8 degrees (resulting in Applicant's shifted angle between the extending

direction and an optical axis of a batonnet within ±1 degree, per Applicant's Figure 3) in order to improve contrast (Constitution) at the time of multiplex driving.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Tanaka to adjust the difference between the rubbing angle directions to 6.8 degrees resulting in a shifted angle between the extending direction and an optical axis of a batonnet within ±1 degree.

As to claim 2, Tanaka teaches the liquid crystal display element as set forth in claim 1, wherein the angle between the rubbing directions is 6.8 degrees, thereby improving contrast (Constitution) at the time of multiplex driving due to the high uniaxiality of the optical axis, 121, of the antiferoelectricphase liquid crystal molecules, 111, (evidence that the optical axis of a batonnet deposited from said first electrode substrate is substantially coincident with the optical axis of a batonnet deposited from said second electrode substrate, thereby achieving the contrast improvement of Tanaka).

Tanaka is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to adjust the optical axis of a batonnet deposited from said first electrode substrate is substantially coincident with the optical axis of a batonnet deposited from said second electrode substrate to improve contrast at the time of multiplex driving.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Tanaka to adjust the optical axis of a batonnet deposited from said first electrode substrate is substantially coincident with the optical axis of a batonnet deposited from said second electrode substrate.

6. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka, as applied to claims 1 and 2 above, in view of Nakamura.

As to claims 3 and 4, Tanaka discloses a liquid crystal display element as set forth in claims 1 and 2.

Tanaka does not explicitly disclose an element, wherein said first and second alignment layers have a surface tension of 49 dyn/cm to 53 dyn/cm.

Nakamura teaches in Example 1 (col. 16, lines 65-69) the use of a surface tension of 50 dyn/cm to establish uniform alignment and improve contrast (col. 17, lines 25-31). Nakamura also teaches in Example 9 (col. 20, lines 64-67) the use of a surface tension of 49 dyn/cm to establish uniform alignment and improve contrast.

Nakamura is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add alignment layers having surface tension in the rage of 49 dyn/cm to 50 dyn/cm (overlaps Applicant's range of 49 dyn/cm to 53 dyn/cm) to establish uniform alignment and improve contrast.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Tanaka with the alignment layer surface tension range of Nakamura.

As to claims 5-7, Tanaka discloses a liquid crystal display element as set forth in claims 1 and 2, and Tanaka in view of Nakamura discloses a liquid crystal display element as set forth in claim 3.

Tanaka does not explicitly disclose a liquid crystal display element as set forth in claim 1, wherein said first electrode substrate is an array substrate comprising: a plurality of scanning lines and signal lines, which are provided on said first substrate in the form of a matrix; switching elements, each of which is formed at a corresponding one of the intersections between said scanning lines and said signal lines, one end of each of said switching elements being connected to a corresponding one of said signal lines, each of said switching elements being open and closed in response to a signal of a corresponding one of said scanning lines; pixel electrodes, each of which is connected to the other end of a corresponding one of said switching elements; and said first alignment layer formed on said first substrate so as to cover said pixel electrodes, and said second electrode substrate is a counter substrate comprising a counter electrode formed on said second substrate, and said second alignment layer formed on said second substrate so as to cover said counter substrate.

Nakamura discloses in Figure 4 (col. 15, lines 48-57) a matrix type LCD element designed to overcome crosstalk and response speed problems while reducing defects (col. 1, lines 44-52) in TFT-type LCDs.

Nakamura is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a matrix type LCD element designed to overcome crosstalk and response speed problems while reducing defects in TFT-type LCDs.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Tanaka with the TFT matrix design of Nakamura.

7. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saishu and Nakamura, as applied to claim 8 above, in view of Tanaka.

As to claim 10, Saishu and Nakamura discloses the liquid crystal display element of claim 8.

Saishu and Nakamura does not explicitly disclose an element, wherein said first and second alignment layers are rubbed in a direction which is substantially parallel to a direction 1 shifted from the normal direction of said light modulating layer and wherein the rubbing direction of said first alignment layer is different from the rubbing direction of said second alignment layer.

Tanaka teaches an element, wherein said first and second alignment layers are rubbed in a direction which is substantially parallel to a direction 1 shifted from the normal direction of said light modulating layer and wherein the rubbing direction of said first alignment layer is different from the rubbing direction of said second alignment layer (col. 3, para 0013, Purpose and Constitution) to improve contrast.

Tanaka is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add rubbing directions in different directions to improve contrast.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Saishu and Nakamura with the rubbing directions of Tanaka to improve contrast.

As to claim 11, mere alteration of the rubbing direction angle to about 10 degrees is not considered patentably distinct. If the Applicant does not agree, a restriction might be appropriate.

Response to Arguments

8. Applicant's arguments filed on 19 August 2002 have been fully considered but they are not persuasive. Applicant's arguments with respect to claims 8-11 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's ONLY arguments are as follows:

(1) As to claims 1-7, 10, and 11, a *prima facie* case of obviousness has not been made by Examiner.

(2) As to claims 1 and 2, Tanaka does not teach or suggest the extending direction of the batonnet is within ± 1 degree.

(3) As to claims 3-7, 10, and 11, Nakamura fails to teach a second alignment with a surface tension of 49 to 53 dyn/cm, and Nakamura requires a difference of at least 9 dyn/cm.

Examiner's responses to Applicant's ONLY arguments are as follows:

(1) It is respectfully pointed out that a *prima facie* case of obviousness has been made by Examiner, per rejections above.

(2) It is respectfully pointed out that Tanaka teaches the angle between the rubbing directions is 6.8 degrees. Applicant provides evidence in the specification that a structure with such an angle between the rubbing directions would result in an extending direction of the batonnet that is within ± 1 degree. This is not improper hindsight, because the result is known (as taught by Applicant) to be a function of the structure taught by Tanaka.

(3) It is respectfully pointed out that Nakamura teachs a second alignment with a surface tension of 48 dyn/cm (about Applicant's 49 dyn/cm) in example 4 as satisfying the conditions of his invention (col. 21, lines 15-19). Nakamura also teaches that the surface treatment applied to the second substrate is not particularly limited as far as the

surface energy relationship of $\gamma_1 > \gamma_2$ is satisfied (col. 11, lines 28-31). Nakamura also claims the range of $\gamma_1 > \gamma_2$ indicating its value as his invention (col. 21 lines 53-67). Examiner maintains that it would have been obvious to those having ordinary skill in the art of liquid crystals at the time the invention was made to use a second alignment treatment with a surface tension of 49 dyn/cm to 53 dyn/cm, per rejections above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L Rude whose telephone number is (703) 305-0418. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William L Sikes can be reached on (703) 308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

Timothy L Rude
Examiner
Art Unit 2871

TLR
October 21, 2002

TOAN TON
PRIMARY EXAMINER